REMARKS/ARGUMENTS

In the Office Action dated May 11, 2005, Claims 1-24 are pending, of which Claims 1, 9, and 19 are independent. Claims 7 and 15-16 are rejected under 35 U.S.C. § 112, second paragraph. Claims 1-8 are rejected under 35 U.S.C. § 102(b) as being anticipated by WO 99/52669 to Thomas, et al. Claims 1-3, 5-11, 13-17, 19-21, and 24 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,783,055 to Ezumi, et al. Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Ezumi, et al. in view of Thomas, et al. Claims 18 and 22-23 are indicated to be allowable if rewritten in independent form.

Claims 1, 15, 16, 18, and 19 are amended above. Claim 7 is cancelled, and new Claims 25-39 are added. Applicant respectfully submits that the claims, as amended, are allowable for the reasons set forth below.

Rejection of Claims 7 and 15-16 under 35 U.S.C. § 112, second paragraph

First, regarding the rejection of Claims 7 and 15-16 under 35 U.S.C. § 112, second paragraph, Claim 7 is cancelled. Further, Claims 15 and 16 have been amended to recite a workpiece with first and second structural portions in a lap configuration with an interface therebetween. The first structural portion has a thickness, and the first pin portion of the rotatable tool defines a length that corresponds substantially to the thickness of the first structural portion. Thus, Applicant submits that the length of the first pin portion is now clearly defined to be dependent on the thickness of the first structural portion. Accordingly, Applicant respectfully requests that the rejection of Claims 15 and 16 under 35 U.S.C. § 112 be withdrawn.

Rejection of independent Claim 1 and various dependent claims as being anticipated by Thomas, et al. and Ezumi, et al.

Applicant now addresses the rejections under 35 U.S.C. § 102 and § 103. Regarding the rejection of Claim 1 as being anticipated by Thomas, et al. and Ezumi, et al., Claim 1 as amended recites a shoulder extending in a direction generally perpendicular to the longitudinal axis of the first pin portion, with the contour surface of the first pin portion opposite the

shoulder. Thus, the shoulder is (or defines) a surface from which the first pin portion extends. Further, "the shoulder is structured to be urged against the workpiece with the first and second pin portions disposed at least partially in the workpiece."

Neither Thomas, et al. nor Ezumi, et al. teaches such a shoulder, from which a first pin portion extends with a contour surface opposite the shoulder. Thomas, et al. describes a tool having a shoulder **101** from which a probe **100** extends. The Examiner has shown by the depiction in the Office Action that the shoulder **101** is considered to be the claimed first pin portion, and the originally unlabeled portion of the tool above the shoulder **101** is considered to the claimed shoulder. However, as now recited, Claim 1 recites that the shoulder extends generally perpendicular to the longitudinal axis of the first pin portion. The only corresponding feature of the tool of Thomas, et al. is the shoulder **101**. That is, the unlabeled portion of the tool above shoulder **101** does not correspond to the claimed shoulder of Claim 1. If the shoulder **101** is considered to be the claimed shoulder, then Thomas, et al. fails to teach a contour surface as claimed. In other words, Thomas, et al. does not describe a shoulder generally perpendicular to a first pin portion, wherein the first pin portion extends from the shoulder and defines a contour surface opposite the shoulder, as claimed.

Similarly, Ezumi, et al. discloses a rotary tool **200** having a large diameter portion **210** with an end surface **210b** that faces a small-diameter portion **220**. *See* col. 6, lines 9-12. The large diameter portion **210** is screwed onto an axial member **230**. The Examiner has shown, again by depiction in the Office Action, that the end surface **210b** is considered to be the claimed first pin portion and the unlabeled portion to the upper right of the axial member **230** is considered to be the claimed shoulder. However, as stated above, Claim 1 as amended recites that the shoulder extends generally perpendicular to the longitudinal axis of the first pin portion. The only corresponding feature of the tool of Ezumi, et al. is the end surface **210b**. That is, the unlabeled portion of the tool to the upper right of the end surface **210b** in Figure 2 does not correspond to the claimed shoulder of Claim 1. In other words, Ezumi, et al. does not describe a shoulder generally perpendicular to a first pin portion, wherein the first pin portion extends from the shoulder and defines a contour surface opposite the shoulder, as claimed. Further, the unlabeled portion to the upper right in Figure 2 (which includes a tapered portion) is not

structured to be urged against the workpiece with the first and second pin portions disposed at least partially in the workpiece, as claimed. Indeed, as illustrated, e.g., in Figure 2, the large-diameter portion **233** does not enter the workpiece during welding. Instead, the end surface **210b** is provided at the surface of the workpiece so that the grooves **213** on the end surface **210b** receive and move metal to the top of the face plate **21**, as shown in Figure 3.

Thus, Applicant respectfully submits that the cited references, alone or in combination, do not teach or suggest the features of Claim 1. Therefore, Claim 1 is allowable over Thomas, et al. and Ezumi, et al., as are each of the dependent Claims 2-8 for the same reasons.

New dependent Claim 25

Newly added Claim 25, which depends from Claim 1, is also allowable for the same reasons. Further, Claim 25 recites that "the shoulder defines a contour surface for frictionally engaging the workpiece." The features of Thomas, et al. and Ezumi, et al. that have been labeled as shoulders in the Office Action do not define contour surfaces for frictionally engaging the workpiece. Indeed, the features labeled as shoulders are not configured to be engaged with the workpiece at all. Thus, Claim 25 is allowable over the cited references for this additional reason.

Claim 18, indicated to be allowable

Claim 18 was previously indicated to be allowable if rewritten in independent form. Applicant has amended Claim 18 to be in independent form and to include all of the features of previous Claim 9, from which Claim 18 formerly depended. Accordingly, Applicant submits that independent Claim 18 is allowable.

Rejection of independent Claims 9 and 19 and various dependent claims as being anticipated by Ezumi, et al.

Independent Claims 9 and 19 are rejected on the sole basis of Ezumi, et al., and each of these rejections is now addressed. Claim 9 recites an apparatus for forming a friction stir weld lap joint. The apparatus includes a tool having a shoulder and first and second pin portions. The first pin portion extends longitudinally from the shoulder and has a contour surface with at least

one spiral ridge opposite the shoulder. The second pin portion, which is narrower than the first pin portion, extends longitudinally from the contour surface of the first pin portion. An actuator is configured to rotate and urge the tool "such that the shoulder is urged against the workpiece, the first pin portion pin extends at least partially through the first structural portion, [and] the second pin portion extends at least partially through the second structural portion."

Ezumi, et al. does not describe a device with a corresponding shoulder and pin portions. That is, the portion to the upper right of the axial member **230** as shown in Figure 2 (and labeled "shoulder" in the Office Action), is not urged against the workpiece. Further, even if the end surface **210b** is considered to be the claimed shoulder, the rotary tool **200** of Ezumi, et al. does not define a contour surface with a spiral ridge opposite thereto.

Therefore, Applicant respectfully submits that Claim 9 is allowable over the cited references, as are each of the dependent Claims 10-18.

Further, as described above, each of Claims 15 and 16 as amended recites a rotatable tool with a first pin portion that defines a length that corresponds substantially to a thickness of a first structural portion. Thus, according to each of these claims, the contour surface of the first pin portion that is opposite the shoulder is disposed within a specified distance from the interface when the shoulder is urged against the first structural portion. Neither of the cited references teaches or suggests this feature. Therefore, Claims 15 and 16 are allowable over the Thomas, et al. and Ezumi, et al. for these additional reasons.

Claim 19, which recites a method for forming a friction stir weld lap joint, has been amended to include a feature previously set forth in Claims 22 and 23, which were indicated to be allowable. In particular, Claim 19 recites "urging the friction stir welding tool in a longitudinal direction substantially perpendicular to the interface such that the shoulder is disposed against the first structural portion and the pin extends through the interface with a first portion of the pin extending longitudinally from the shoulder at least partially through the first structural portion to a contour surface of the first pin portion defining at least one ridge extending in a spiral configuration, a second portion of the pin extending longitudinally from a contour surface of the first pin portion at least partially through the second structural portion such that the first and second pin portions thereby plasticize a portion of the workpiece and form a friction stir

weld joint therein." Ezumi, et al. does not teach or suggest disposing a shoulder against a structural portion, with a first pin portion extending from the shoulder at least partially through the structural portion to a contour surface defining a spiral ridge. That is, even if the end surface **210b** is considered to be the claimed shoulder, the rotary tool **200** of Ezumi, et al. does not define a contour surface with a spiral ridge as claimed.

Therefore, Applicant respectfully submits that Claim 19 is allowable over the cited references, as are each of the dependent Claims 20-24.

Newly added Claims 26-39

New independent Claim 26 is also directed to a rotatable tool for friction stir welding. Similar to Claim 18, which was indicated to be allowable, the tool includes a first pin portion that extends from a shoulder and defines a contour surface, and a second pin portion that extends from the contour surface of the first pin portion. Both of the pin portions are configured to be able to frictionally engage the workpiece during a friction stir welding procedure. None of the cited references teach such a configuration. Accordingly, Applicant submits that Claim 26 is allowable.

Similarly, new independent Claim 27 is also directed to a tool for use in friction stir welding, and recites a shoulder that includes a contour surface, a first pin portion that extends from the contour surface, and a second pin portion extending from the first pin portion. None of the cited references teach such a configuration. Accordingly, Applicant submits that Claim 27 is allowable, as are each of the dependent Claims 28-38.

New independent Claim 39 is directed to a method of friction stir welding, which includes rotating a tool. The tool includes a shoulder including a contour surface and a first pin portion that extends from the contour surface. The workpiece is engaged with the contour surface of the shoulder. None of the cited references teach such a method. Accordingly, Applicant submits that Claim 39 is allowable.

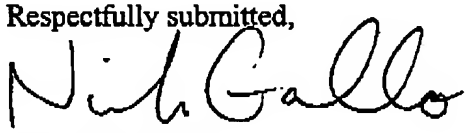
* * * *

CONCLUSIONS

In view of the remarks presented above, Applicant submits that each of the pending Claims 1-6 and 8-39 is allowable over the cited references and, therefore, the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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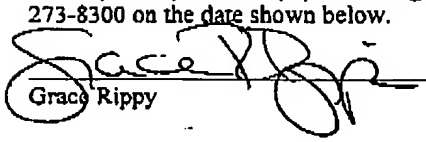

Grace Rippy

August 9, 2005
Date